
Space Weather Forecast

Issued on Wednesday, 20 December 2023 at 01:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of isolated Moderate-class flares throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity is Low, with a peak common class flare at 19/0304 UTC from a region approaching centre disc in the northern hemisphere. Ten sunspot regions feature on the visible disc. One in the southeast is the largest, with continued growth and slight increase in magnetic complexity observed. Two in the northeast have displayed slight increase in areal extent and proliferation of intermediate spots. The region which has rotated around the northeast limb contains several modest sized spots, but with a simple magnetic configuration. Another region in the southwest has a somewhat complex appearance but otherwise remains largely unchanged. All other spots are small and simple.

No Earth-directed coronal mass ejections (CMEs) have been observed.

Solar Wind / Geomagnetic Activity: The solar wind environment was characterised by the ongoing effects of the fast wind from a coronal hole. Solar winds were mainly at strong levels, peaking at 719km/s at 19/0643 UTC, but has recently declined to around 570-600km/s. The interplanetary magnetic field was initially moderate, but became weak from 19/0059 UTC. The north-south component varied weakly and was largely positive in direction, though was mainly negative between 19/0000-0400 UTC. Resultant geomagnetic activity was largely Quiet to Unsettled (Kp 1-3), but with an Active (Kp4) interval from 19/0000-0300 UTC.

Energetic Particles / Solar Radiation: High Energy Proton flux has been at Background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low with a chance of becoming Moderate with isolated Moderate-class flares. The greatest risk of significant flares are from the numerous regions in the eastern hemisphere.

Solar Wind / Geomagnetic Activity: A weak CME arrival is possible early on day 1 (20 Dec), otherwise no Earth-directed CMEs feature in the forecast period. Solar winds are currently at elevated to strong levels due to the ongoing high speed stream from a coronal hole. Speeds should slowly ease back to persistently elevated, then later slightly elevated through days 1 and 2 (20-21 Dec). On day 2 or 3 (21-22 Dec) there is the chance of a connection to another high-speed stream in the southern hemisphere that could result in a further enhancement to the solar wind, however confidence for this is low given its mid-latitude location on the disc. In the absence of any further enhancement in later days, winds should trend back towards background speeds.

Geomagnetic activity should remain largely Quiet to Unsettled during the period. There is a chance of peak Active conditions and a slight chance of a G1/Minor storm interval upon the arrival of a weak CME early day (20 Dec), or from the possible onset of the high speed stream from a coronal hole on days 2 or 3 (21/22 Dec).

Energetic Particles / Solar Radiation: Solar radiation storms are considered very unlikely.

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Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	10	10	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)